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TD Spotlight
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Human Effectiveness Directorate:

The Power of Human Performance

by the Human Effectiveness Directorate

WRIGHT-PATTERSON AFB, Ohio — The Human Effectiveness Directorate of the Air Force Research Laboratory develops, integrates, and transitions science and technology products to train warfighters; improves the interface of operators with weapon systems; and protects and sustains Air Force people to assure the preeminence of U.S. aerospace forces. The directorate is located at Wright-Patterson Air Force Base, Ohio; Brooks Air Force Base, Texas; and Mesa, Arizona.

The directorate's multidisciplinary workforce of nearly 600 civilians, officers and enlisted personnel encompasses engineering, behavioral sciences, life sciences, physical sciences, medical and health professionals, math and computer sciences, and support staff. Since much of the research effort is conducted using in-house facilities, the workforce also includes about 500 contractors and collaborators.

The directorate's science and technology program is focused into four primary thrusts: warfighter training, crew system interface, bioeffects and protection, deployment and sustainment. The research activities to accomplish these thrusts are accomplished by five technology divisions: Warfighter Training Research, Crew System Interface, Biodynamics and Protection, Directed Energy Bioeffects, and Deployment and Sustainment.

The Warfighter Training Research Division is the USAF's premier organization for research and development in warfighter training techniques and technologies. The division develops, demonstrates, evaluates, and transitions training technologies and methods to train warfighters as they fight. The mission is accomplished through an open, collaborative environment in which government, academia, and industry team with users and customers to develop and exploit new technologies, applications, and environments that will support the warfighter. The collaboration is designed to improve development, validation, and transition of needed training products to users, customers, and solution providers supporting the premise of training the way we intend to fight and recognizing that training is the peacetime manifestation of war.

The Crew System Interface Division studies human capabilities and characteristics that could be applied to the design of equipment, operations, and work environments. Successful military performance is dependent on the effective integration of human and systems technologies. Human-centered systems promote success through superior operability, maintainability, and survivability. The ultimate advantages of technological advances in controls, displays, and information handling, remain inextricably linked to human factors such as the pilot's sensory, perceptual, cognitive, and motor capabilities; strength and anthropometrics; motivation; experience; and skills. The Crew System Interface Division ensures this linkage by anticipating future needs, developing human engineering technologies, and providing human-system integration design criteria to exploit the fullest potential of the Air Force warfighting team, irrespective of gender, mission, or environment.

The Directed Energy Bioeffects Division predicts, mitigates, and exploits the bioeffects of directed energy on DoD personnel, aerospace missions, and the environment. The division's research focuses on the bioeffects of optical and radio frequency radiation and mechanisms of action, advancing health and safety guidelines and standards, and personal protection concepts. The research provides the database necessary to enable development of effective non-lethal weapons. The division supports warfighters with the biological effects information necessary to safely train, communicate, fight and win

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on the directed energy-saturated battlefield of the future.

The Frank M. Tejada Directed Energy Bioeffects Laboratory, a part of the Directed Energy Division, is the center for non-ionizing radiation hazards research. This tri-service reliance activity in directed energy bioeffects includes laser and radio frequency radiation. The U.S. Army Medical Research Detachment of Walter Reed Army Institute of Research and the Naval Health Research Center Detachment are a part of this reliance activity at Brooks AFB.

The Biodynamics and Protection Division develops technologies for new equipment and procedures to improve warfighter performance, protection, and survivability. Countermeasures are developed to reduce altitude decompression sickness risk for special operations, combat search and rescue, and reconnaissance missions. Protection technologies are developed to reduce the physiological and cognitive performance degradation during maneuvering accelerations. Human biodynamic response to emergency escape environments are measured and modeled to improve occupant safety and ensure accommodation of the expanded aircrew population. Warfighter fatigue countermeasures and vigilance enhancement technologies are developed to extend and improve cognitive performance in complex, long-duration mission environments. Oxygen generation technologies are developed to reduce Air Expeditionary Force deployment footprints. Technical expertise and facilities also support DoD requirements for man rating of life support and personal equipment.

The Deployment and Sustainment Division maximizes warfighter effectiveness by improving logistician capabilities and assuring survivability in toxic environments. This division focuses on technologies which support global Expeditionary Aerospace Force operations and Agile Combat Support. The three major division objectives are: ensuring the capability and agility of Air Force logistic systems, minimizing the mission impact from toxic chemicals and chemical-biological weapon agents, and decreasing weapons system life cycle cost due to hazardous materials.

The Tri-Service Toxicology Consortium, which is a part of the Deployment and Sustainment Division, addresses critical DoD toxicology issues by leveraging the recognized strengths of each service partner. The Consortium provides DoD with timely solutions to current and anticipated operational problems through an integrated approach to innovative toxic hazard effects research. Under Project Reliance, the Naval Health Research Center Toxicology Detachment and the Operational Toxicology Branch of AFRL's Human Effectiveness Directorate are collocated at Wright-Patterson AFB. The third element, the US Army Center for Environmental Health Research, is located at Ft. Detrick, MD. Each service maintains a toxicology research facility with unique, mutually supportive core capabilities. The Air Force specializes in toxicological modeling and dermal toxicology; the Navy in inhalation, combustion, and neurobehavioral toxicology; and the Army in environmental toxicology. @